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<p>(21) International Application Number: PCT/GB93/01965 (22) International Filing Date: 17 September 1993 (17.09.93)  (30) Priority data: 9219875.3 19 September 1992 (19.09.92) GB  (71) Applicant (for all designated States except US): GRASEBY MEDICAL LIMITED [GB/GB]; Colonial Way, Watford, Hertfordshire WD2 4LG (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): LINDSEY, Michael, John [GB/GB]; 366 High Street, Berkhamsted, Hertfordshire HP4 1HU (GB). (74) Agents: MAGGS, Michael, Norman et al.; Kilburn &amp; Strobe, 30 John Street, London WC1N 2DD (GB).</p>		<p>(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Published With international search report.</p>
<p>(54) Title: PROGRAM CARD</p> <div data-bbox="495 1228 1201 1596" data-label="Image"> <p>The diagram shows a rectangular program card (12) with a top edge (10) and a bottom edge. Inside the card, there is a grid of ten circular components (14) arranged in two rows of five. The card is shown within a frame that has notches at the top and bottom.</p> </div> <p>(57) Abstract</p> <p>A host apparatus (for example medical infusion pump equipment) is operated by means of controls on a replaceable program card/electronic card. A selection of different cards is provided, programmed differently, which allows the user of the apparatus to select between different operating regimes. Different cards may also provide for messages in different languages on an alphanumeric display.</p>		

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PROGRAM CARD

5       The present invention relates to so-called  
"electronic cards" or electronic modules, and  
particularly although not exclusively to such cards or  
modules which come in a variety of types, one of which is  
selected by the user and plugged in or otherwise attached  
10       to a host apparatus. By choosing an appropriate card,  
the user can arrange for the host apparatus to operate  
according to one of a number of possible modes. The  
program card may also include additional memory for the  
host apparatus.

15       The use of such cards is well known in association  
with personal computers, and with complex electronically  
controlled apparatus such as cameras, both of which  
incorporate the necessary electronic processors and  
memory to provide the apparatus with a basic range of  
user-controllable functions, which may be further  
20       extended by use of electronic cards.

      The present invention provides an electronic card  
which itself incorporates user-adjustable controls,  
thereby enabling a user to control, modify or adjust the  
functioning of the program card and/or to control modify  
25       or adjust the functioning of the host apparatus.

      One embodiment of the invention, an electronic card  
in accordance with the invention provides the whole  
control function for the associated apparatus, thereby  
enabling a basic apparatus to be provided with a range of  
30       different functions, or sets of functions, by appropriate  
change of electronic card.

      The electronic card of such an embodiment may  
incorporate and/or provide the control panel of the  
associated apparatus.

In one application of the invention, medical infusion pump equipment comprising an electric pump, pressure sensor, electrically-operated fluid control valves and an electronic display, is able to provide a range of different infusion regimes by choice of an electronic card, each one of which incorporates the appropriate controlling software and user controls for the respective regime.

The individual electronic cards may be marked to indicate the regime provided, may be provided in versions having control markings in different languages and may be programmed to give display indications in a corresponding range of languages.

It will be appreciated that an electronic card in accordance with the present invention provides a ready means of selecting the operating mode or regime of a basic piece of equipment, providing the user controls for that equipment, and of tailoring that equipment for sale into and use in markets with different languages.

The invention will be described by way of example with reference to the embodiment illustrated in the accompanying drawings of which:

Figure 1 shows an assembled controllable program card in accordance with the invention;

Figure 2 shows interior detail of the card of Figure 1;

Figure 3 shows the circuit diagram of circuitry incorporated in the card of Figure 1;

Figure 4 shows the front elevation of a medical infusion pump assembly adapted to receive the card of Figure 1;

Figure 5 shows the location of the card in the upper portion of the assembly of Figure 4; and

Figure 6 shows the upper part of the assembly of

Figure 4 with the card in place.

Referring to the drawings, an electronic card in accordance with the preferred embodiment of the invention is shown at 10, mounted with a carrier 12. The card bears switch buttons 14 forming part of a membrane switch assembly within the body of the card. The switches operate to control various functions of apparatus with which the card is associated, via the electronic circuitry incorporated in the card.

Figure 2 illustrates the printed circuit board 20 incorporated within the card 10, carrying membrane switch pads 22, associated with the switch buttons 14, integrated circuits 24 and 26, and an electrical connector socket 28.

The circuit diagram of the electronic assembly carried by the board 20 is illustrated in Figure 3, the same parts carrying the same reference numerals.

Referring to Figure 4, a medical infusion pump assembly comprises a housing 40 incorporating pump, electromechanical valves, pressure sensor(s) (not shown) and a flexible bag infusate reservoir 42. In operation the assembly is arranged to pump infusate from the reservoir 42 through flexible piping via controllable valves to the infusion cannula 44 to a patient, all under the control of software carried within an electronic card, such as 10, which is shown in Figure 5 being put into place in the upper part of the housing 40.

To do that, the head 44 is drawn upwardly (to the right in Figure 5), the program card 10 inserted in the recess 46, and the head 44 replaced into position, a mating connector (not shown) within the head 44 engaging with the socket 28 to effect electrical connection between the electronic card 10 and the infusion pump assembly 40.

In Figure 6, the infusion pump assembly 40 is shown with the card 10 in place, providing a front panel and control means for the pump assembly, to cause the components of the pump assembly 40 to function in a manner determined by the programming of the electronic card 10.

In a typical electronic card used in such an application the apparatus-controlling software is stored in reprogrammable flash memory, and operating date storage and history storage in an EEPROM device.

By providing a series of differently programmed cards 10, the same basic infusion pump assembly 40 can be made to function in different ways dependent upon the software program incorporated in the card plugged into the pump assembly.

The electronic card 10 may carry legends appropriate to the functions which it will permit the pump assembly to perform, and to the user controls, and may carry legends in the language of the user nationality.

The electronic card can, in addition to the programming associated with the pump functions, be programmed to deliver display messages in the language of the user.

It will be appreciated that various changes may be made without exceeding the scope of the invention. For example the electronic program card may be incorporated in other than medical instruments and may be incorporated in instruments already possessing control means, in which it could serve to provide a subsidiary control function.

CLAIMS:

1. An electronic card adapted to plug into or otherwise  
5 be removably attached to a host apparatus, the card  
having user-operable controls thereon by means of which,  
when the card is attached as aforesaid to a host  
apparatus, a user can control the operation of the host  
apparatus.
- 10 2. An electronic card as claimed in Claim 1 which is  
adapted to provide a replaceable user-operable control  
panel for the said host apparatus.
- 15 3. A host apparatus including a removable electronic  
card, the card having user-operable controls thereon by  
means of which the user can control the operation of the  
host apparatus.
- 20 4. A host apparatus as claimed in Claim 3 having no  
user-operable controls other than those on the card.
5. A host apparatus as claimed in Claim 3 or Claim 4  
having an alphanumeric display, the card including  
25 display control means for controlling operation of the  
display.
6. A host apparatus as claimed in any one of Claims 3  
to 5 in combination with a plurality of removable  
30 electronic cards, each of which is arranged to operate  
the host apparatus differently.
7. A host apparatus as claimed in Claim 6 when  
dependent upon Claim 5 in which the display control means

for each respective card is arranged to provide a display in a different language.

8. A host apparatus as claimed in any one of Claims 3  
5 to 7 comprising medical infusion pump equipment.

9. A host apparatus as claimed in Claim 8 when  
dependent upon Claim 7 or upon Claim 6 in which each  
respective card provides a different infusion regime.



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FIG. 1

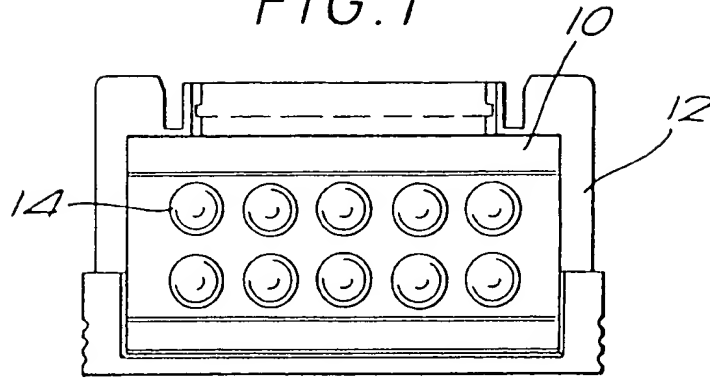
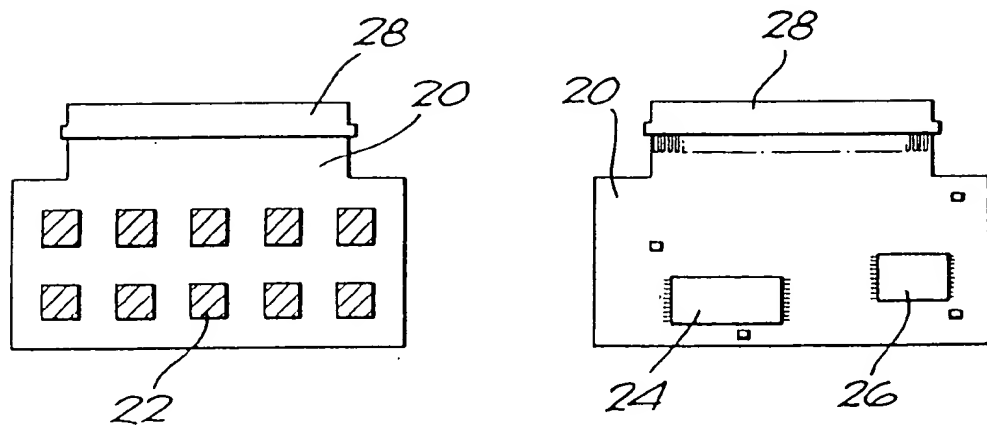
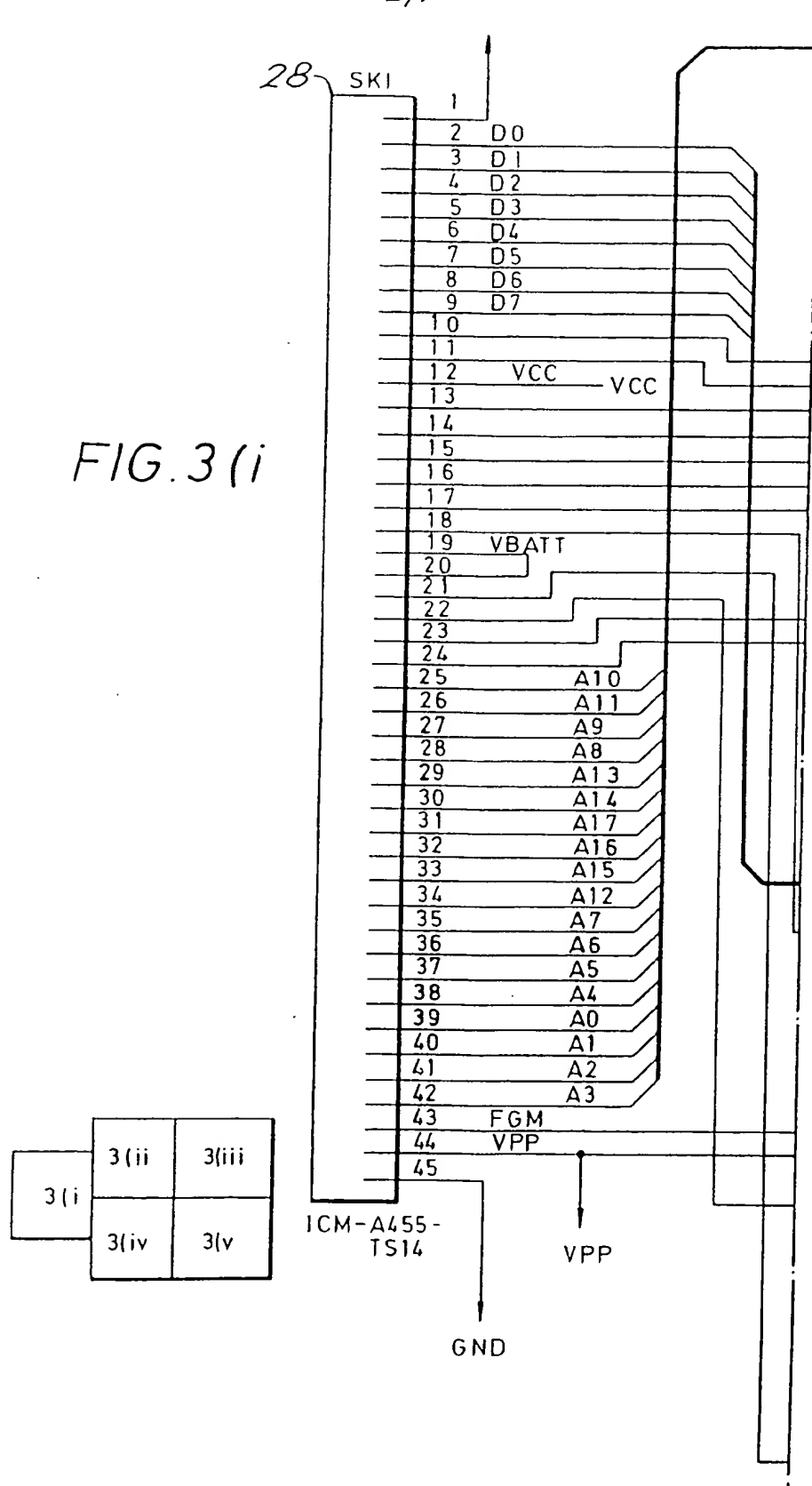


FIG. 2



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FIG. 3(i)



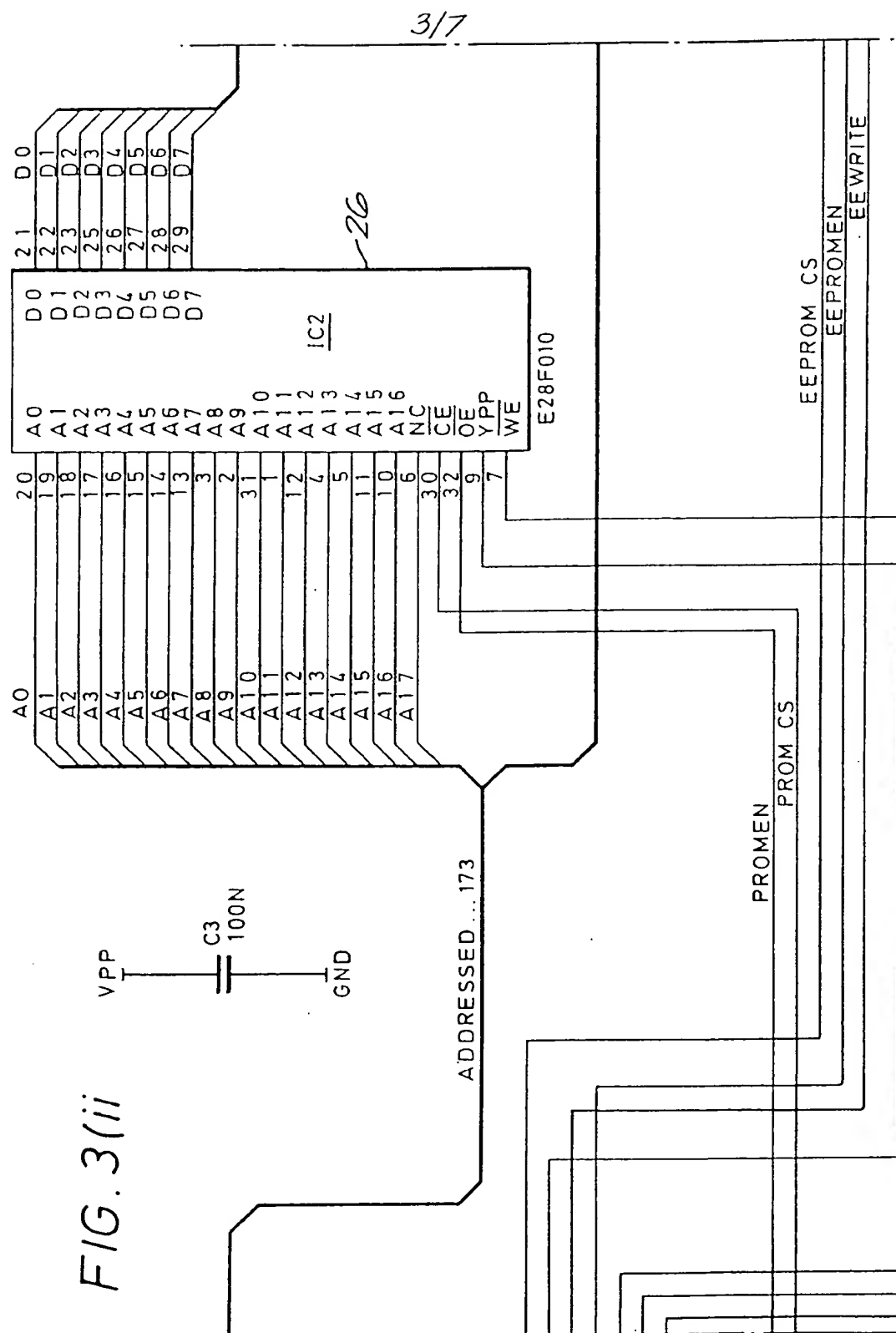
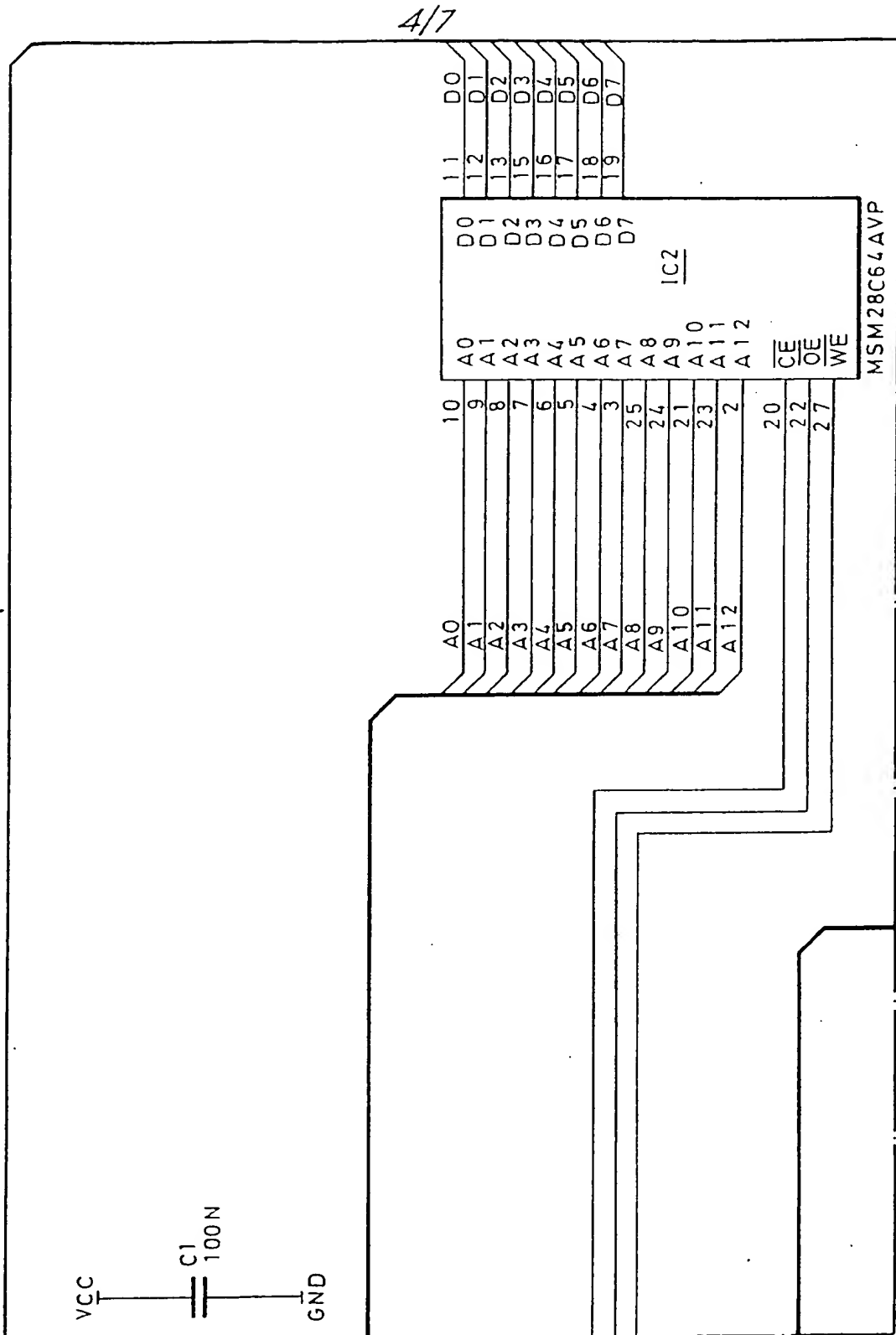


FIG. 3(iii)



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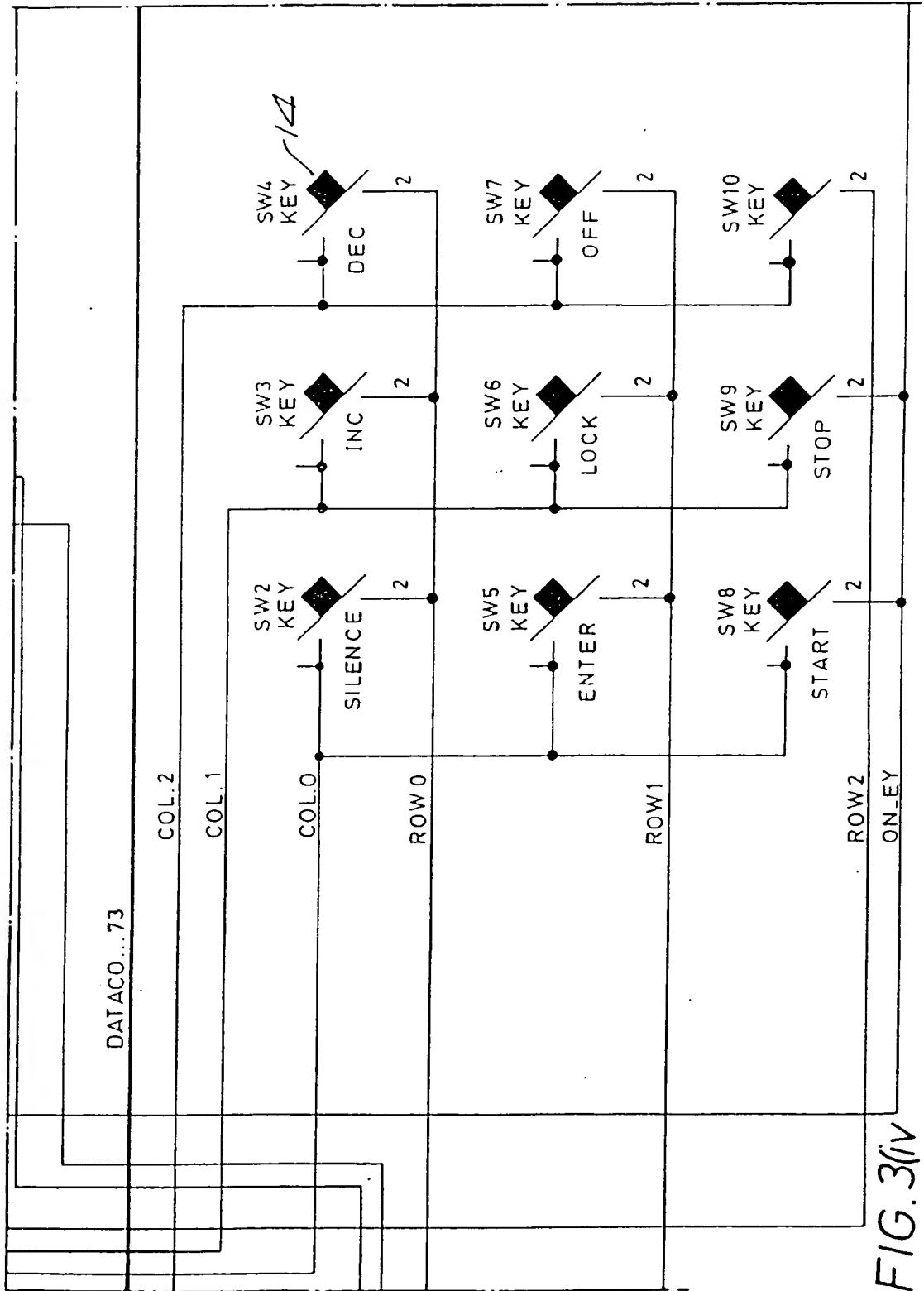


FIG. 3(iv)

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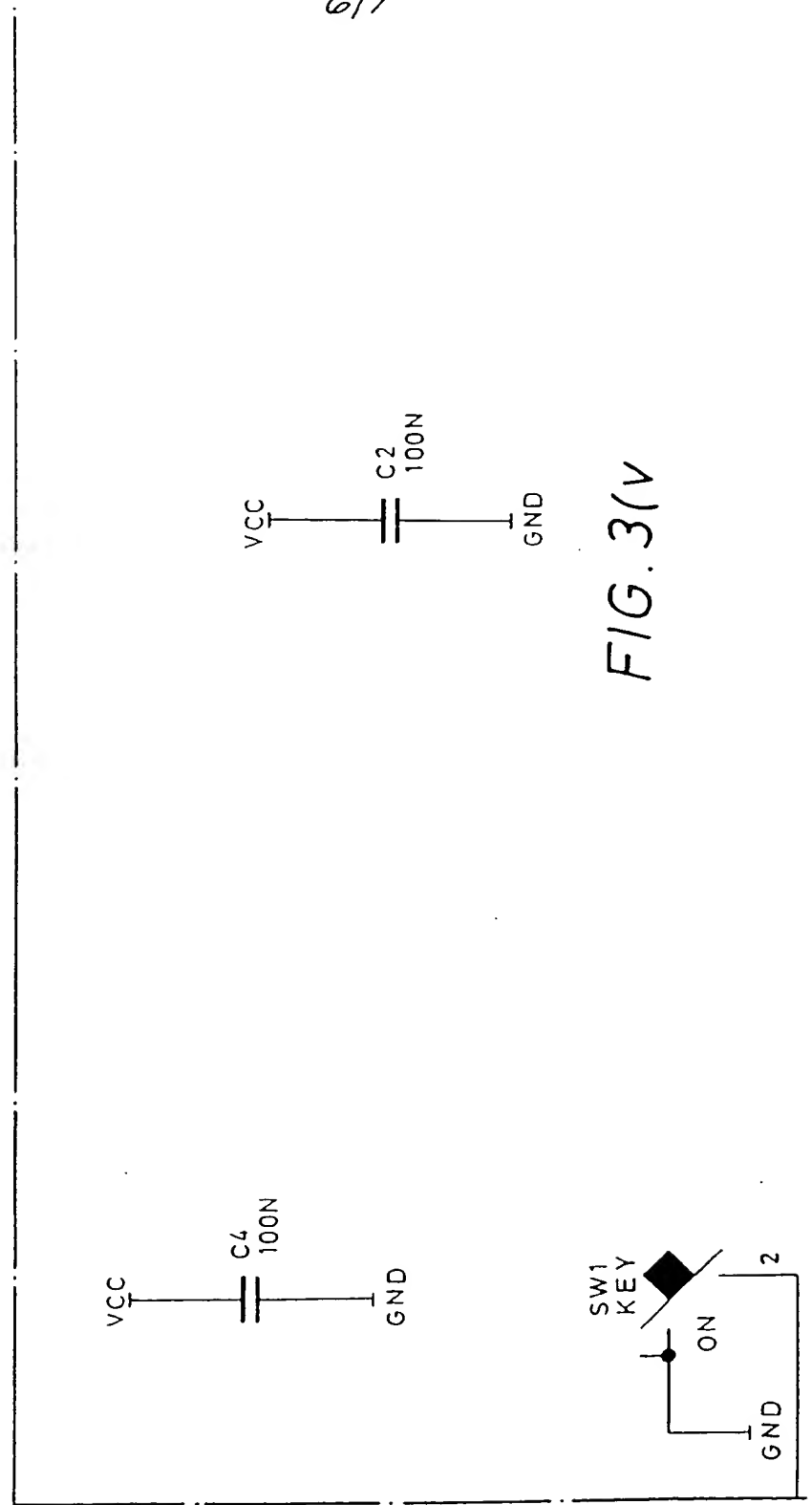


FIG. 3(v)

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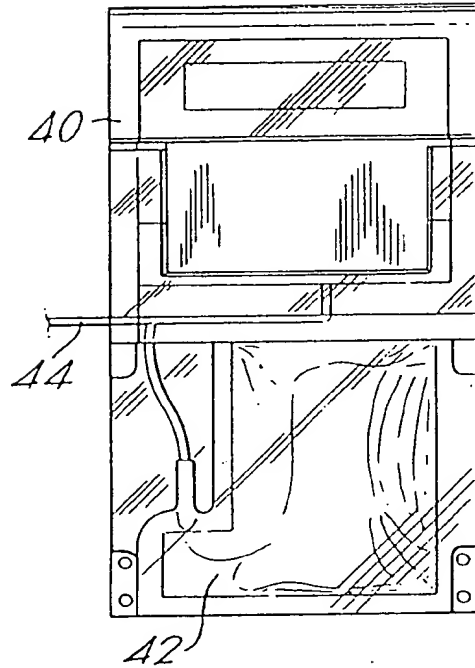


FIG. 4

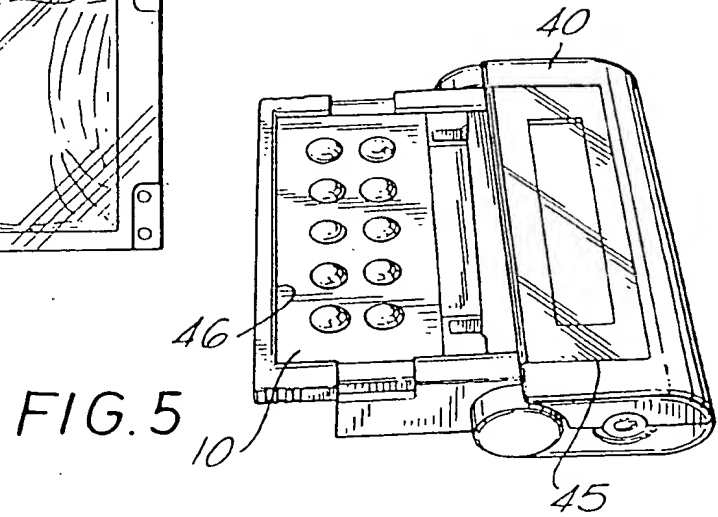
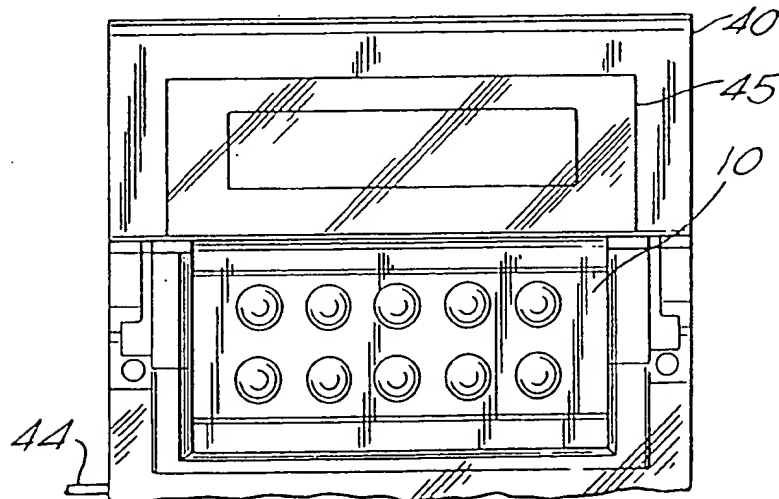


FIG. 5

FIG. 6



## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 93/01965

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 5 G05B19/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 G05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,36 37 684 (SHARP K.K.) 7 May 1987 see abstract see column 1, line 63 - line 66 see column 2, line 21 - line 47 see column 5, line 15 - line 38 see figure 2	1-6
Y	---	7-9
X	FR,A,2 616 941 (PHOTOWATT INTERNATIONAL S.A.) 23 December 1988 see page 3, line 28 - line 32 see figure 2	1,3,4
A	---	2,5,6
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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	---	8,9
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# INTERNATIONAL SEARCH REPORT

information on patent family members

Initial Application No  
PCT/GB 93/01965

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